

**ENGINEERING CHANGE NOTICE**

1. ECN **653801**

Proj. ECN

2. ECN Category (mark one) Supplemental <input type="checkbox"/> Direct Revision <input checked="" type="checkbox"/> Change ECN <input type="checkbox"/> Temporary <input type="checkbox"/> Standby <input type="checkbox"/> Supersedure <input type="checkbox"/> Cancel/Void <input type="checkbox"/>	3. Originator's Name, Organization, MSIN, and Telephone No. Andrew M. Templeton, Data Assessment and Interpretation, R2-12, 373-5589	4. USQ Required? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	5. Date 05/26/99	
	6. Project Title/No./Work Order No. Tank 241-BY-102	7. Bldg./Sys./Fac. No. 241-BY-102	8. Approval Designator N/A	
	9. Document Numbers Changed by this ECN (includes sheet no. and rev.) HNF-SD-WM-ER-630, Rev. 0-B	10. Related ECN No(s). ECNs: 635508, 649433	11. Related PO No. N/A	

12a. Modification Work <input type="checkbox"/> Yes (fill out Blk. 12b) <input checked="" type="checkbox"/> No (NA Blks. 12b, 12c, 12d)	12b. Work Package No. N/A	12c. Modification Work Complete N/A Design Authority/Cog. Engineer Signature & Date	12d. Restored to Original Condition (Temp. or Standby ECN only) N/A Design Authority/Cog. Engineer Signature & Date
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13a. Description of Change  
 This ECN has been generated in order to update the document to reflect results of recent data/information evaluation.

13b. Design Baseline Document?  Yes  No

Replace pages:  
 2-1, 2-2, 4-1, 4-2, 5-1, and 5-2

14a. Justification (mark one)

Criteria Change <input checked="" type="checkbox"/>	Design Improvement <input type="checkbox"/>	Environmental <input type="checkbox"/>	Facility Deactivation <input type="checkbox"/>
As-Found <input type="checkbox"/>	Facilitate Const <input type="checkbox"/>	Const. Error/Omission <input type="checkbox"/>	Design Error/Omission <input type="checkbox"/>

14b. Justification Details

A tank characterization report page change revision is required to reflect the results of recent evaluation of data/information pertaining to adequacy of tank sampling for safety screening purposes (Reynolds et al. 1999, Evaluation of Tank Data for Safety Screening, HNF-4217, Rev. 0, Lockheed Martin Hanford Corporation, Richland, Washington).

15. Distribution (include name, MSIN, and no. of copies)  
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RELEASE STAMP

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# Tank Characterization Report for Single-Shell Tank 241-BY-102

Andrew M. Templeton

Lockheed Martin Hanford Corp., Richland, WA 99352  
U.S. Department of Energy Contract 8023764-9-K001

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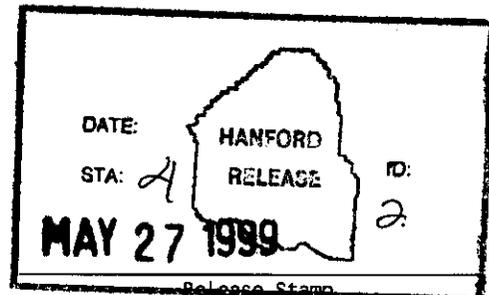
Key Words: Waste Characterization, Single-Shell Tank, SST, Tank 241-BY-102, Tank BY-102, BY-102, BY Farm, Tank Characterization Report, TCR, Waste Inventory, TPA Milestone M-44

Abstract: N/A

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## 2.0 RESPONSE TO TECHNICAL ISSUES

The following technical issues have been identified for tank 241-BY-102 (Brown et al. 1996). They are:

Safety screening:

- Does the waste pose or contribute to any recognized potential safety problems?

Organic safety issue:

- Does the waste contain organics in concentrations that can support a propagating chemical reaction?

Hazardous vapor safety screening:

- Does the vapor headspace exceed 25 percent of the lower flammability limit (LFL)? If so, what are the principal fuel components?
- Are compounds of technological significance present in the tank at such a level that the industrial hygiene group shall be alerted to their presence so adequate breathing zone monitoring can be accomplished and future activities in and around the tank can be performed in a safe manner?

Organic solvents:

- Does an organic solvent pool exist that may cause an organic solvent pool fire or ignition of organic solvents entrained in waste solids?

The TCP (Winkelman 1996) provides the types of sampling and analysis used to address the above issues. Data from the recent analysis of a core sample and tank headspace sampling and flammability measurements, as well as available historical information, provided the means to respond to these issues. This response is detailed in the following sections. See Appendix B for sample and analysis data for tank 241-BY-102.

### 2.1 SAFETY SCREENING

The data needed to screen the waste in tank 241-BY-102 for potential safety problems are documented in *Tank Safety Screening Data Quality Objective* (Dukelow et al. 1995). These potential safety problems are exothermic conditions in the waste, flammable gases in the waste and/or tank headspace, criticality conditions, and the presence of a separable organic layer in the waste. No separable organic layer was observed in any of the samples. The remaining safety issues are addressed separately below.

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For safety assessment, the safety screening DQO suggests an optimum of two full-depth profiles of the waste. Although the optimum was not met, the tank was sufficiently sampled to satisfy the requirements of safety screening (Reynolds et al. 1999). One core was recovered, less the bottom 48 cm (19 in.) of tank waste.

### **2.1.1 Exothermic Conditions (Energetics)**

The first requirement outlined in the safety screening DQO (Dukelow et al. 1995) is to ensure that there are not enough exothermic constituents in tank 241-BY-102 to cause a safety hazard. Because of this requirement, energetics in tank 241-BY-102 were evaluated. The safety screening DQO required that the waste sample profile be tested for energetics every 24 cm (9.5 in.) to determine if the energetics exceeded the safety threshold limit. The threshold limit for energetics is 480 J/g on a dry weight basis.

Results obtained using differential scanning calorimetry (DSC) indicated that although small exotherms ( $< 150$  J/g on a dry weight basis) were observed in some of the samples, the threshold limit was not exceeded on any of the samples. Additionally, the highest upper limit of the one-sided 95 percent confidence interval for these results was less than the threshold limit of 480 J/g on a dry weight basis (approximately 170 J/g on a dry weight basis). The method used to calculate confidence limits is contained in Appendix C. Because only one of the two core samples contained any sample, the requirement for measuring energetics could be met for only one core sample. However, there is no indication that energetics is a concern for this tank.

Historically, there is no evidence that substantial quantities of any exothermic agent should exist in this tank's waste. Waste transfer records indicate that the major waste type expected to be in the tank is BY saltcake (Agnew et al. 1996b). BY saltcake is not expected to contain ferrocyanide constituents, and organic compounds are expected to be present at less than 1 wt% (Agnew et al. 1996a). However, the tank was recently added to the organic DQO as discussed in Section 2.2.

### **2.1.2 Flammable Gas**

Vapor samples were taken in November 1995. Vapor phase measurements were taken in the tank headspace during core sampling in June and July 1996. The vapor samples and vapor phase measurements indicate that flammable gases were well below the threshold limit of 25 percent of the LFL. All combustible gas meter readings were zero percent of the LFL. The vapor samples were also well below the threshold limit. Data from these vapor phase measurements are presented in Appendix B.

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#### 4.0 RECOMMENDATIONS

All analytical results for the safety screening and organic DQOs were well within the safety notification limits. This tank was sufficiently sampled to satisfy the requirements of safety screening (Reynolds et al. 1999). All of the analyses that were performed were done in accordance with the applicable DQO documents. Furthermore, a characterization best-basis inventory was developed for the tank contents.

Table 4-1 summarizes the status of the Project Hanford Management Contract (PHMC) TWRS Program office review and acceptance of the sampling and analysis results reported in this TCR. All DQO issues required to be addressed by sampling and analysis are listed in column one of Table 4-1. The second column indicates whether the requirements of the DQO were met by the sampling and analysis activities performed and is answered with a "Yes" or "No." The third column indicates concurrence and acceptance by the program in TWRS that is responsible for ensuring that sampling and analysis activities were performed adequately and meet the requirements of the DQO. A "Yes" or "No" in column three indicates acceptance or disapproval of the sampling and analysis information presented in the TCR. If the results/information have been reviewed, but acceptance or disapproval has not been determined, "n/d" is shown in the column. If the results have not been reviewed, "n/r" is shown in the column.

Table 4-1. Acceptance of Tank 241-BY-102 Sampling and Analysis.

Issue	Sampling and Analysis Performed	PMHC Program Office Acceptance
Safety screening DQO	Yes	Yes
Organic DQO <sup>1</sup>	Yes	Yes
Hazardous vapor safety screening DQO	Yes	Yes
Organic solvent	Yes	Yes

Note:

<sup>1</sup> Organics issue was closed in December 1998 (Owendoff 1998)

Table 4-2 summarizes the status of the PMHC TWRS Program review and acceptance of the evaluations and other characterization information contained in this report. The evaluations specifically outlined in this report are the evaluation to determine if there is an organic safety concern, and the evaluation to determine whether the tank is safe, conditionally safe, or unsafe. Column one lists the different evaluations performed in this report. Columns two and three are in the same format as Table 4-1. The manner in which concurrence and acceptance are

summarized is also the same as that in Table 4-1. None of the analyses performed on the core sample indicate any safety problems.

Table 4-2. Acceptance of Evaluation of Characterization Data and Information for Tank 241-BY-102.

Issue	Evaluation Performed	PHMC Program Office Acceptance
Safety categorization (tank is safe)	Yes	Yes
Hazardous vapor	Yes	Yes
Organic solvent	No	n/r

Note:

n/r = not reviewed.

## 5.0 REFERENCES

- Agnew, S. F., J. Boyer, R. A. Corbin, T. B. Duran, J. R. Fitzpatrick, K. A. Jurgensen, T. P. Ortiz, and B. L. Young, 1996a, *Hanford Tank Chemical and Radionuclide Inventories: HDW Model Rev. 3*, LA-UR-96-858, Los Alamos National Laboratory, Los Alamos, New Mexico.
- Agnew, S. F., P. Baca, R. A. Corbin, T. B. Duran, and K. A. Jurgensen, 1996b, *Waste Status and Transaction Record Summary for the Southwest Quadrant*, WHC-SD-WM-TI-614, Rev. 2, Westinghouse Hanford Company, Richland, Washington.
- Brown, T. M., S. J. Eberlein, J. W. Hunt, and T. J. Kunthara, 1996, *Tank Waste Characterization Basis*, WHC-SD-WM-TA-164, Rev. 2, Westinghouse Hanford Company, Richland, Washington.
- Cash, R. J., 1996, *Scope Increase of "Data Quality Objective to Support Resolution of the Organic Complexant Safety Issue," Rev. 2*, (internal letter 79300-96-029 to S. J. Eberlein, July 12), Westinghouse Hanford Company, Richland, Washington.
- DOE-RL, 1996, *Recommendation 93-5 Implementation Plan*, DOE/RL-94-0001, Rev. 1, U.S. Department of Energy, Richland, Washington.
- Dukelow, G. T., J. W. Hunt, H. Babad, and J. E. Meacham, 1995, *Tank Safety Screening Data Quality Objective*, WHC-SD-WM-SP-004, Rev. 2, Westinghouse Hanford Company, Richland, Washington.
- Ecology, EPA, and DOE, 1996, *Hanford Federal Facility Agreement and Consent Order*, as amended, Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy, Olympia, Washington.
- Fritts, L. L., 1996a, *Tank 241-BY-102, Cores 157 and 159, Analytical Results for the 45-Day Report*, WHC-SD-WM-DP-196, Rev. 0, Rust Federal Services of Hanford, Inc., Richland, Washington.
- Fritts, L. L., 1996b, *Tank 241-BY-102, Cores 157 and 159, Analytical Results for the Final Report*, WHC-SD-WM-DP-196, Rev. 1, Rust Federal Services of Hanford, Inc., Richland, Washington.
- Hanlon, B. M., 1996, *Waste Tank Summary Report for Month Ending September 30, 1996*, WHC-EP-0182-102, Westinghouse Hanford Company, Richland, Washington.

- Hodgson, K. M., and M. D. LeClair, 1996, *Work Plan for Defining a Standard Inventory Estimate for Wastes Stored in Hanford Site Underground Tanks*, WHC-SD-WM-WP-311, Rev. 1, Lockheed Martin Hanford Corporation, Richland, Washington.
- Homi, C. S., 1995, *Vapor Sampling and Analysis Plan*, WHC-SD-WM-TP-335, Rev. 1, Westinghouse Hanford Company, Richland, Washington.
- Kummerer, M., 1995, *Heat Removal Characteristics of Waste Storage Tanks*, WHC-SD-WM-SARR-010, Rev. 1, Westinghouse Hanford Company, Richland, Washington.
- Osborne, J. W., and L. L. Buckley, 1995, *Data Quality Objectives for Tank Hazardous Vapor Safety Screening*, WHC-SD-WM-DQO-002, Rev. 2, Westinghouse Hanford Company, Richland, Washington.
- Owendoff, J. M. 1998, *Approval to Close the Organic Complexant Safety Issue and Remove 18 Organic Compleant Tanks from the Watchlist*, (memorandum to J. Wgoner, December 9), U. S. Department of Energy, Washington D. C.
- Public Law 101-510, 1990, "Safety Measures for Waste Tanks at Hanford Nuclear Reservation," Section 3137 of *National Defense Authorization Act for Fiscal Year 1991*.
- Reynolds, D. A., W. T. Cowley, J. A. Lechelt, and B. C. Simpson, 1999 and C. DeFigh-Price, *Evaluation of Tank Data for Safety Screening*, HNF-4217, Rev. 0, Lockheed Martin Hanford Corporation, Richland, Washington.
- Smith, D. A., 1986, *Single-Shell Tank Isolation Safety Analysis Report*, WHC-SD-WM-SAR-006, Rev. 2, Westinghouse Hanford Company, Richland, Washington.
- Thomas, B. L., J. C. Evans, K. H. Pool, K. B. Olsen, J. S. Fruchter, and K. L. Silvers, 1996, *Headspace Vapor Characterization of Hanford Waste Tank 241-BY-102: Results from Samples Collected on 11/21/95*, PNNL-11164, Pacific Northwest National Laboratory, Richland, Washington.
- Turner, D. A., H. Babad, L. L. Buckley, and J. E. Meacham, 1995, *Data Quality Objective to Support Resolution of the Organic Complexant Safety Issue*, WHC-SD-WM-DQO-006, Rev. 2, Westinghouse Hanford Company, Richland, Washington.
- Winkelman, W. D., 1996, *Tank 241-BY-102 Tank Characterization Plan*, WHC-SD-WM-TP-446, Rev. 2, Lockheed Martin Hanford Corporation, Richland, Washington.

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